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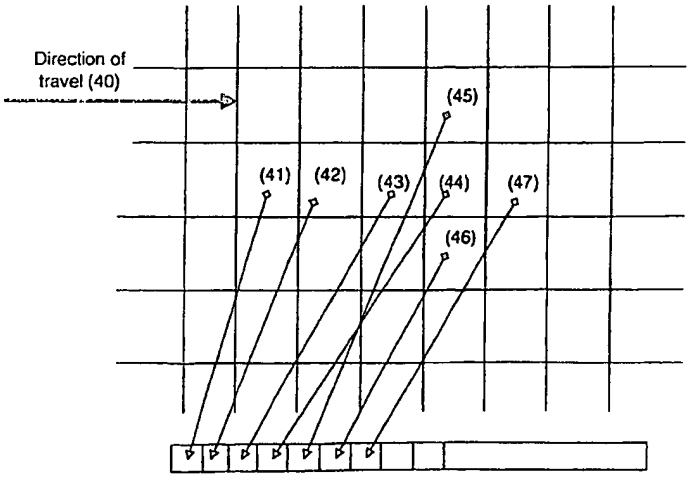
(54) Title: MAP SERVICE



(57) Abstract: The invention relates to a method at a wireless communications system which makes possible that map information can be generated in a service server and transmitted to a mobile client, where the map is gradually built up on a display unit depending on the client's geographical position and movement. A map over a whole district is transmitted in a data stream as separate, small map segments, but with only one call to the service server. The client unpacks the data stream in real time, extracts the map segments and shows them on the display unit as they are arriving. The map database sorts the map segments in a specific order, based on in which order the map segments shall be shown on the client's window. The sorting is based on: the client's position, the client's movement - both direction and speed, the time (RTT) for transmission of a map.

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MAP SERVICE

Technical field

The present invention relates to a method, which, at a wireless communications system, makes possible that map information can be generated in a service server and be transmitted to the display unit at a mobile client or user terminal, where the map gradually is built up depending on the client´s geographical position and movement. The map information is transmitted to the client as an amount of separate objects, map segments, in an efficient and bandwidth saving way, and district map is gradually built up on the display unit.

Prior art

It is well known to transmit maps via radio or cable connection. At present there are no known services that make it practically feasible to transmit maps to mobile clients.

Technical problem

Wireless communication always implies that the bandwidth is limited. This is a problem when larger amounts of data shall be transmitted and the bandwidth is small. If information shall be transmitted via mobile telephone networks, such as GSM, this results in problems depending on the limited bandwidth of the media. This has resulted in that maps, which normally include large amounts of data, have not been transmitted via such communication.

At travels, information is often needed about the position, and often also map information for planning of

route. To directly get access to such information while travelling, one is obliged to use mobile communication, often mobile telephony, and consequently transmission of maps is a bottleneck.

Two-way communication means that the client requests a map image, and a map database responds by transmitting an image of a map. This results in an extensive communication with questions and answers for each transmitted map segment, and by that a high load on the transmission media.

At reception of a map the whole map is shown only when the whole image of the map has been transmitted. By that it will take long time before the user will get any information from the map.

Transmission of map segments is made in the order they have been stored in the database. This results in that the client has no possibility to prioritise the transmission to get a quicker access to the map segments of greatest importance or those most up-to-date.

Technical solution

This invention shows how map information is generated in an intelligent way to make it possible to be distributed to a client where the map gradually is built up, adapted to the client's position and movement. The map information is transmitted continuously, efficient and adapted to the client to utilise the limited bandwidth that is available.

From the client the following information is transmitted to the server:

- the client's position

- the district for which map is wanted
- the client's speed vector
- information about which map segments that are stored in the client.

The method implies that a map over a whole district can be transmitted to the client as an amount of separate, small map images, but initiated by only one call to the service server. The vector of objects, i.e. map segments, which has been created by the algorithm in the map database is converted to a data stream, for instance by means of standard functions in the program language Java. Data in the stream then can be condensed by a suitable condensation algorithm, such as zip, and be transmitted to the client.

The client unpacks the stream in real time and extracts the map segments (objects), which are shown as they arrive. By this method is made possible rapid load of map also by TCP/IP over GSM.

By the map being packed in a stream, the client only needs to make one request for each map, but yet can receive the map segments and unpack them and show them on the client's display unit as they are arriving.

By the method, the traditional structure that characterises the traffic on Internet is avoided, with "request-response" for each transmitted object (map segment). This means, in addition to saved time and load in servers, also that the limited bandwidth is not loaded with unnecessary traffic. In order to further maximise the transmission speed of map data, data that are transmitted are condensed.

Explanation of terms

GPS	Global Positioning System.
GSM	Global System for Mobile Communication. Cellular mobile telephone system.
RTT	Round Trip Time. The time from that a request has been transmitted to the service logic, until the wanted information has been received.
IP	Internet Protocol. Protocol that is used in Internet.
TCP	Transport Communication Protocol.
ISP	Internet Service Provider. Internet provider.

DETAILED DESCRIPTION

The description below refers to the figures in the enclosed drawings.

Structure

The present invention describes the information service, suitably built up as a client/server solution. The invention can constitute a map support directly adapted to the user's utilisation, or constitute a part of an information service where a service provider, for instance an ISP, offers a service where map information is a part. To each service server a multiple of clients can be connected, which makes the system scalable. The clients are connected to the service server and all communication is

passing via this service server, which in its turn is connected to a map database.

The client's position, which is needed for showing the right district map to the user, is obtained by means of a positioning system, for instance GPS, but the position can alternatively be entered manually.

All communication can be executed by means of TCP/IP, which is used on Internet. This means that the parts need not be on the same physical place, and that it is easy to connect a client to the service server.

Transmission of map

According to the invention, a map is transmitted of a whole district as separate, small map segments, but by only one call to the service server. The vector of objects, i.e. map segments, which is created by the algorithm in the map database, is converted into a "data stream" by means of standard functions in the program language Java. Data in the stream are condensed by means of a suitable algorithm (for instance zip) and the condensed stream is then transmitted over TCP/IP to the client.

The client unpacks the stream in real time and extracts the objects (map segments) and shows them on the display as they are arriving. By this method fast loading of map is made possible also by TCP/IP over GSM.

By the map being packed in a data stream, the client only need to make one request for each map, but yet can receive a suit of map segments.

The terminal transmits, at request for transmission of map, en vector that informs about which segments that are

already stored in the client. This vector contains the identity of stored map segments.

By the two-way communication, the terminal in this way can control which map segments that shall be transmitted. Map segments that are already stored in the client equipment by that need not to be transmitted again.

Map database

The map database contains a number of large images over larger districts (11) such as Stockholm, Luleå, Gotland etc. In the map database, which can be for instance bitmapped maps or vector based maps, is analysed which district the client wants, and the whole map image, which contains the district of which the client has requested a map, is derived. From this whole map image the map district (12) that corresponds to the district the client has requested is cut, see Figure 1.

The map database divides the cutting in objects (i.e. map segments) comprising for instance 100*100 pixels at bitmapped maps. See Figure 2.

The map database sorts the objects (map segments) in a specific order, based on in which order the map segments shall be shown on the client's window. The sorting is primarily based on:

- the client's position,
- the client's movement; both direction and speed,
- RTT, (Round Trip Time), i.e. the time it will take from that the client has requested a map, until the map has arrived at the client.

The scale of the map can be flexible, so that the user can get an overview over a larger district, at the same time as he/she can see details in the neighbourhood of position of current interest.

The user can request different scales for different parts, depending on need.

The scale can be related to available transmission capacity and speed. At poor transmission capacity, or at rapid movement, the level of detailed presentation can be reduced.

Alternative positioning

The user can request showing of a map over another district than where he/she is. By providing position information, the user can get a map image for, for instance, planning of a journey.

Infrastructure and alternatives

Other computer networks than Internet can be utilised and the communication of the terminal can pass via GSM or other communication network.

The positioning/position indication can be made by GPS, other positioning system, or by manual position indication.

The invention is applicable to both vector maps and bitmapped maps, or maps that are utilising other technology.

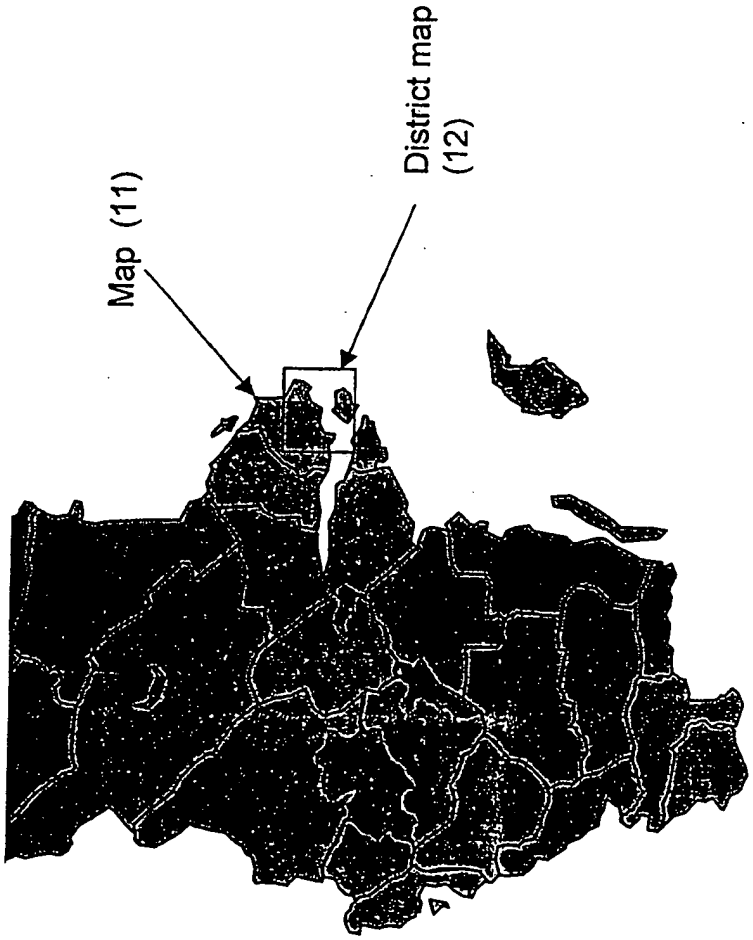

Figure 1